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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/721,167	11/22/2000	Yoram Uziel	STC-38090	3296

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APPLIED MATERIALS, INC.
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SANTA CLARA, CA 95050

EXAMINER

HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 08/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/721,167

Applicant(s)

UZIEL ET AL.

Examiner

Parviz Hassanzadeh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,5-22 and 34-51 is/are pending in the application.
- 4a) Of the above claim(s) 20 and 34-51 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5-19,21 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Priority

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in PCT on 12/23/99. It is noted, however, that applicant has not filed a certified copy of the PCT application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 5-11, 19, 21, 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maekawa et al (EP-0,764,478-A1) in view of Engelsberg et al (US Patent No. 5,531,857), Vaught (US Patent No. 5,023,424) and Maurer (US Patent No. 5,634,230).

Maekawa et al teach an apparatus for cleaning (*removing particles from*) the surface of a substrate, the apparatus comprising:

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a spin chuck 2 for holding a semiconductor substrate 1 (*moving chuck, which is configured to receive the substrate and to move the substrate*); and

a *vertically and horizontally movable swing arm 7* which supports a cleaning unit 6 (column 4, line 15-37).

Maekawa et al fail to teach an optical arm adapted to direct a beam of electromagnetic energy onto the surface of the substrate causing the particles to be dislodged from the surface.

Engelsberg et al teach an apparatus (Figs. 1, 2) for removing surface contaminants from the surface of a substrate by high energy radiation without damaging the substrate. The apparatus includes a means for flowing a gas 18 over a substrate 12 and a radiation source 14 such as a laser for generating a radiation 11 directed against the treatment surface of the substrate (column 4, line 29 through column 5, line 15). The radiation from a radiation source 14 can be conducted through a radiation conduit 50 (Fig. 5) which is an optical guide such as a bundle of optical fibers or light pipe while a gas is conducted from a gas source 16 to the treatment surface via gas line 51. Radiation conduit 50 and gas line 51 merge to a cable head 53 (Fig. 5, column 9, lines 61 through column 10, line). The cable 53 through a robotic arm 81 can spin 360 degree and a base 83 thereof can be moved up and down (Fig. 19, column 12, lines 12-23).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the optical arm as taught by Engelsberg et al in the apparatus of Maekawa et al in order to remove particles from the surface of a substrate without altering the underlying molecular crystal structure of the substrate (abstract).

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Maekawa et al in view of Engelsberg et al teach all limitations of the claims except for a particle localization unit for determining the input position coordinate of the particles to the surface of the substrate.

Vaught teach an apparatus (Fig. 1) for dislodging particles from a wafer surface. The apparatus includes a particle detector 15 and the computer 19 for locating and storing the locations of particles on a wafer 11. The computer 19 being responsive to a particle detector 15 and controlling element 17 to select shock waves point of origin. The computer may control scanning of the entire wafer by shock wave producing element 17. (abstract, column 3, lines 24-34).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the particle detector and the computer system as taught by Vaught in the apparatus of Maekawa et al in view of Engelsberg et al in order to direct the laser beam on particles detected on the surface of substrate.

Maekawa et al in view of Engelsberg et al and Vaught teach all limitations of the claims except for a particle localization unit and the optical arm (particle removal unit) being located in the same chamber.

Maurer teaches an automated cleaning apparatus (Fig. 2) for removing particle contamination from an object 10 wherein the apparatus utilizes an inspection device to identify the position of any particles contaminants on the target object and a probe 40 to remove the particle contaminants from the target object and wherein both the inspection device and the probe are arranged in the same chamber and using the same support stage 32 which is moved

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between the detection device and the probe by a drive mechanism 34 (column 3, line 50 through column 4, line 16).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange both the particle localization unit (detection device) and the optical particle removal unit (probe) in the same chamber as taught by Maurer in order to perform the detection and the removal process in the same chamber.

Further regarding integration of the particle detector unit and the particle removal unit within a single process chamber: According to *in re Dulberg*, 289 F.2d 522, 523, 129 USPQ 348, 349 (CCPA 1961) (see MPEP 2144.04 V.B making integral and MPEP 2144.04 V.C making separable) it would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate two separate units into a single unit in order to reduce the space occupied by the apparatus as well as the apparatus manufacturing cost.

Further regarding type of lasers: It would have been obvious to one of ordinary skill in the art at the time of the invention to employ various types of conventional laser sources as an art recognized equivalent for each other in a laser-based particle removing apparatus. See MPEP 2144.06, Art Recognized Equivalent for the Same Purpose, Substituting Equivalents Known for the Same Purpose (*in re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982)).

Claims 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maekawa et al (EP-0,764,478-A1) in view of Engelsberg et al (US Patent No. 5,531,857) and Vaught (US Patent No. 5,023,424) as applied to claims 1, 3, 5-11, 19, 21, 22 above, and further in view of Allen (US Patent No. 4,987,286).

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Maekawa et al in view of Engelsberg et al and Vaught teach all limitations of the claims except for the optical arm including channels for conveying vapor to the substrate surface and exhausting vapor from the substrate surface.

Allen teaches an apparatus for dislodging particles from a surface by interposing an energy transfer medium between particles and the surface to be cleaned and irradiating the medium with laser energy at a wavelength which is strongly absorbed by the medium such that the medium absorbs sufficient energy to cause explosive evaporation with sufficient force to dislodge the particles (abstract). The apparatus (Figs. 4, 5) includes a liquid source 60 for introducing a liquid such as water to the surface of a substrate 54 by a dosing tube 61; and a laser source 64 for irradiating the wet surface area (column 7, line 43 through column 8, line 17). In another embodiment (Fig. 5) the apparatus also includes a gas source 70 having an inlet conduit 71 for introducing a gas jet and a vacuum source 72 having a conduit 73 for drawing away particles freed by the laser 65 (column 9, lines 6-35).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the liquid introducing, the gas introducing and the vacuum source as taught by Allen in the apparatus of Maekawa et al in view of Engelsberg et al, Vaught and Maurer in order to cause explosive evaporation to dislodge the particles to be removed and further to draw away particles freed from the surface.

Response to Arguments

Applicant's arguments with respect to claims 1, 3, 5-19, 21, 22 have been considered but are moot in view of the new ground(s) of rejection.

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The Applicants assert that the neither of the prior art of record teaches the use of the same chuck for both particle detection and radiation-based particle removal.

The Examiner argues that Vaught uses the same chuck 13 for performing the detection and the removal process. Further, the Examiner argues that it would have been obvious to one of ordinary skills in the art to integrate the particle detection and the particle removal unit into a single process chamber and thus using the same chuck for performing both the particle detection and particle removal as taught by Maurer in order to enhance the throughput as well as to reduce the space occupied by the apparatus and the apparatus manufacturing cost.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

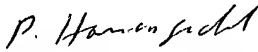
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*Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Parviz Hassanzadeh** whose telephone number is (703)308-2050.*

The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.


Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

August 14, 2003